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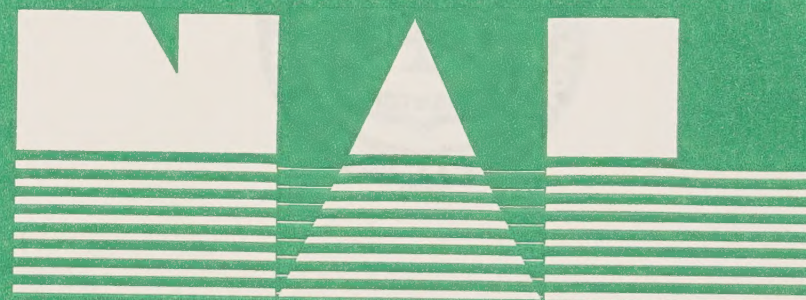


# **RANGE ANALYSIS** and PROPER USE MANAGEMENT

on the *National Forests* and *National Grasslands*



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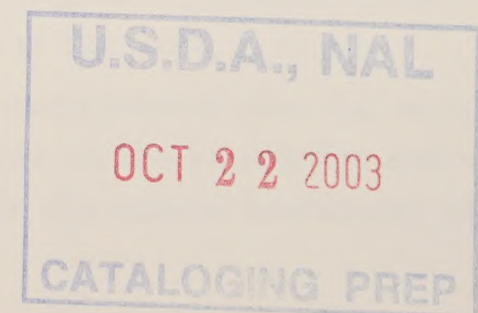
April, 1964 • Missoula, Montana



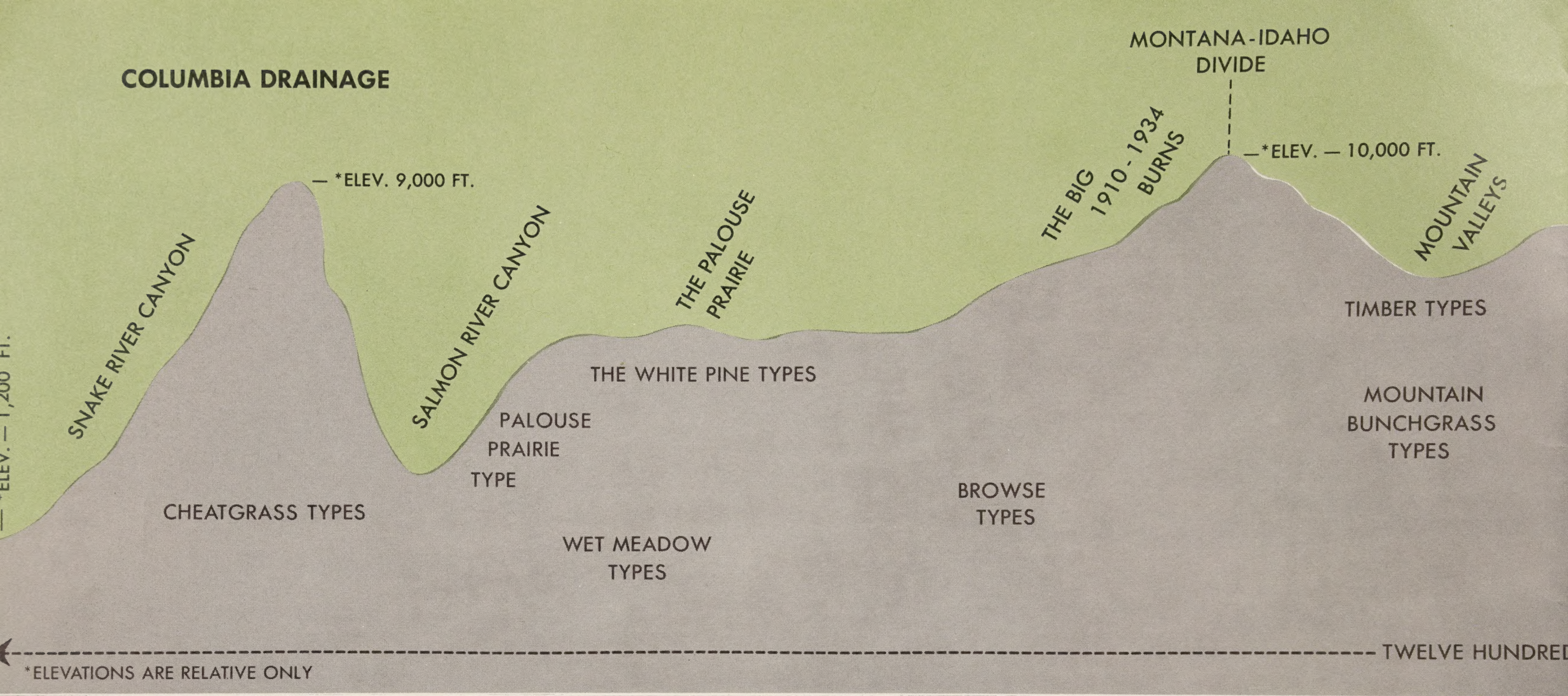


*Cattle on Powderhorn Creek, Deerlodge National Forest.*

**Range analysis and proper use management**  
**promote**  
**stabilized grazing**

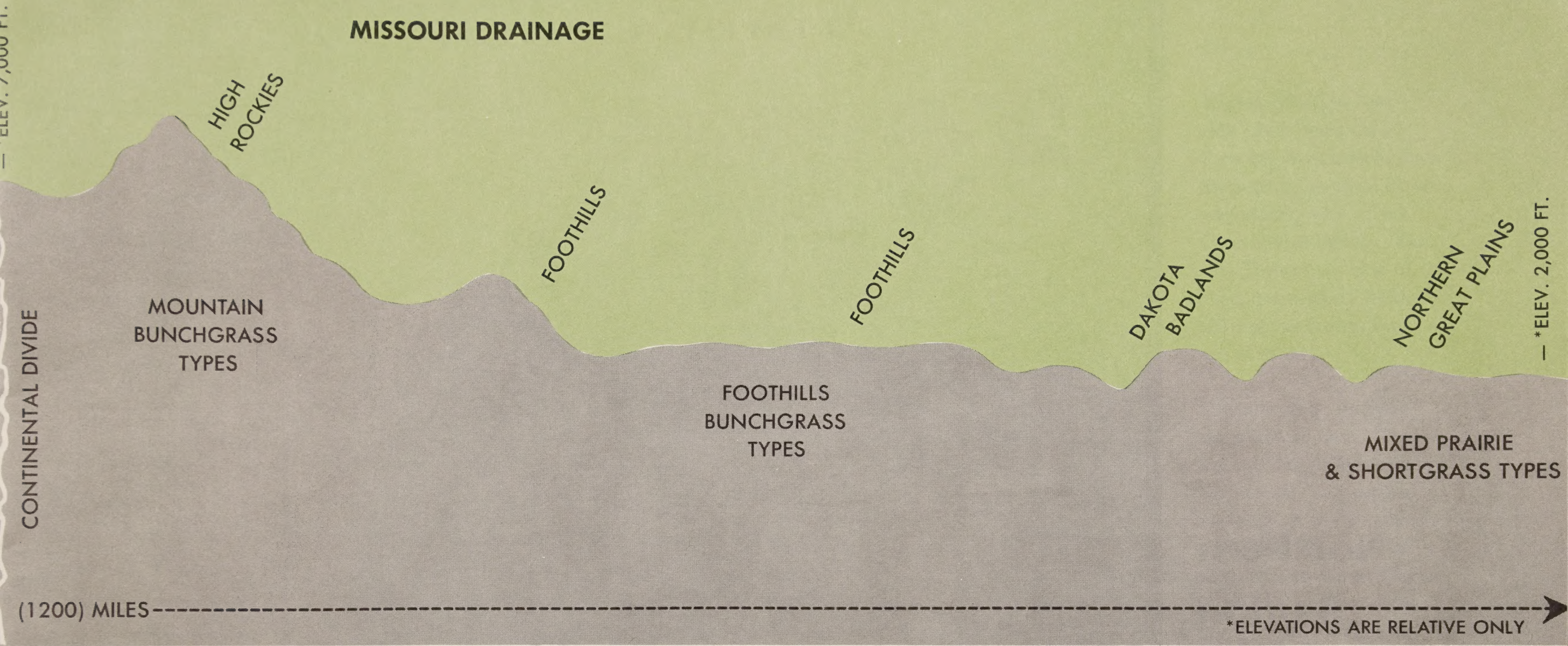






## Profile of the Northern Region





This booklet describes the Range Allotment Analysis procedures and Proper Use Management objectives of the Northern Region.

About 200,000 cattle and horses and 200,000 sheep graze on 7 million acres of National Forests and National Grasslands. This land is divided into approximately 2,000 range allotments.

Big game, small game, upland game birds, waterfowl, fish, and other forms of wildlife are abundant on nearly all of the 26 million acres of land and water in the 16 National Forests and three National Grasslands of the Region.

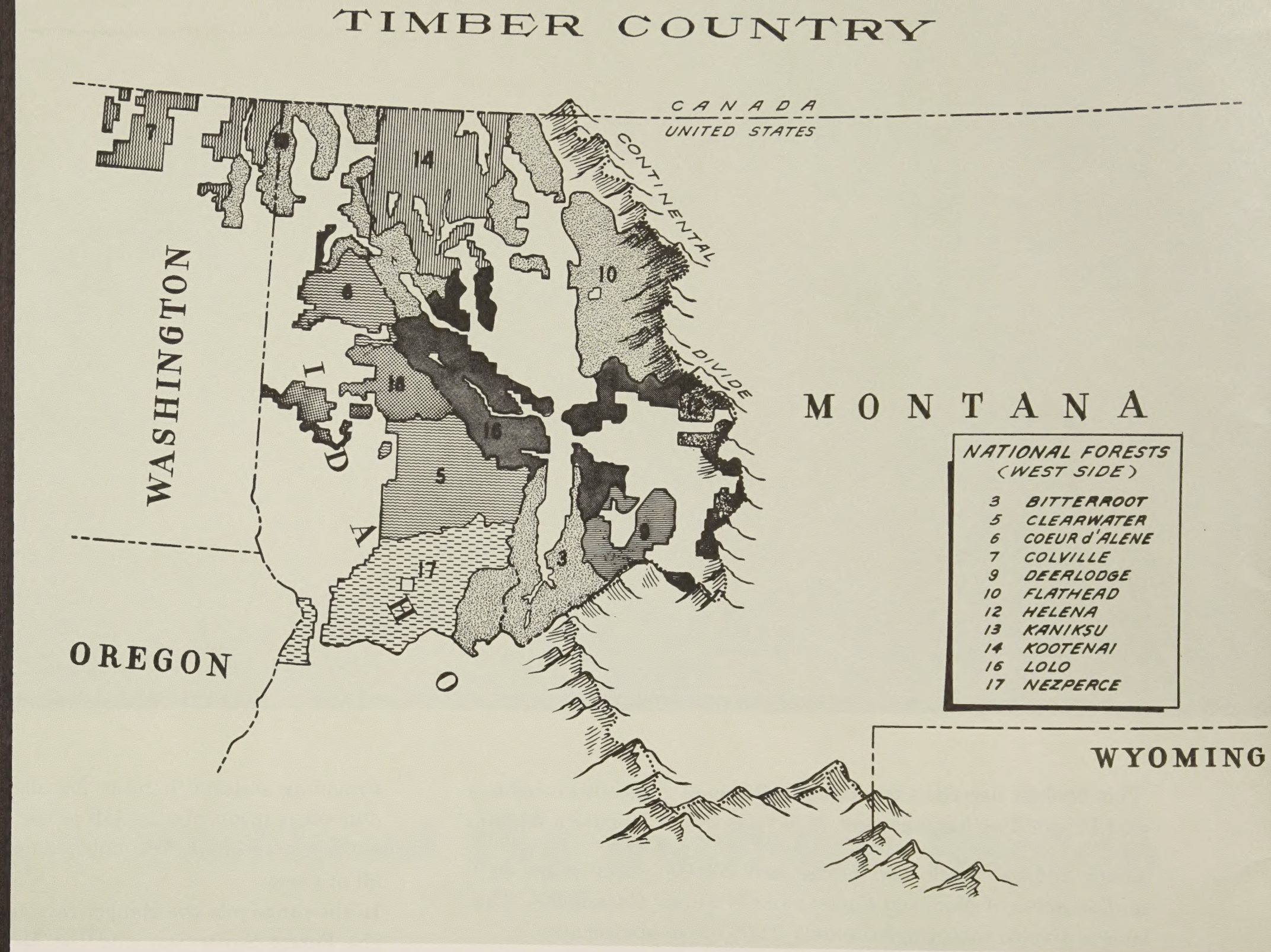
Providing suitable habitat for all of these domestic and wild animals is primarily the job of the District Ranger. Other uses must be correlated. His multiple-use management plan considers all of these.

In the range job, the Ranger receives guidance and counsel from the Forest Supervisor and the Regional Forester. Their staff technicians help in special phases of the work.

In preparing the most practical management plan for each individual allotment, the Ranger draws on the knowledge and experience of the permittee, especially in the animal husbandry phases.



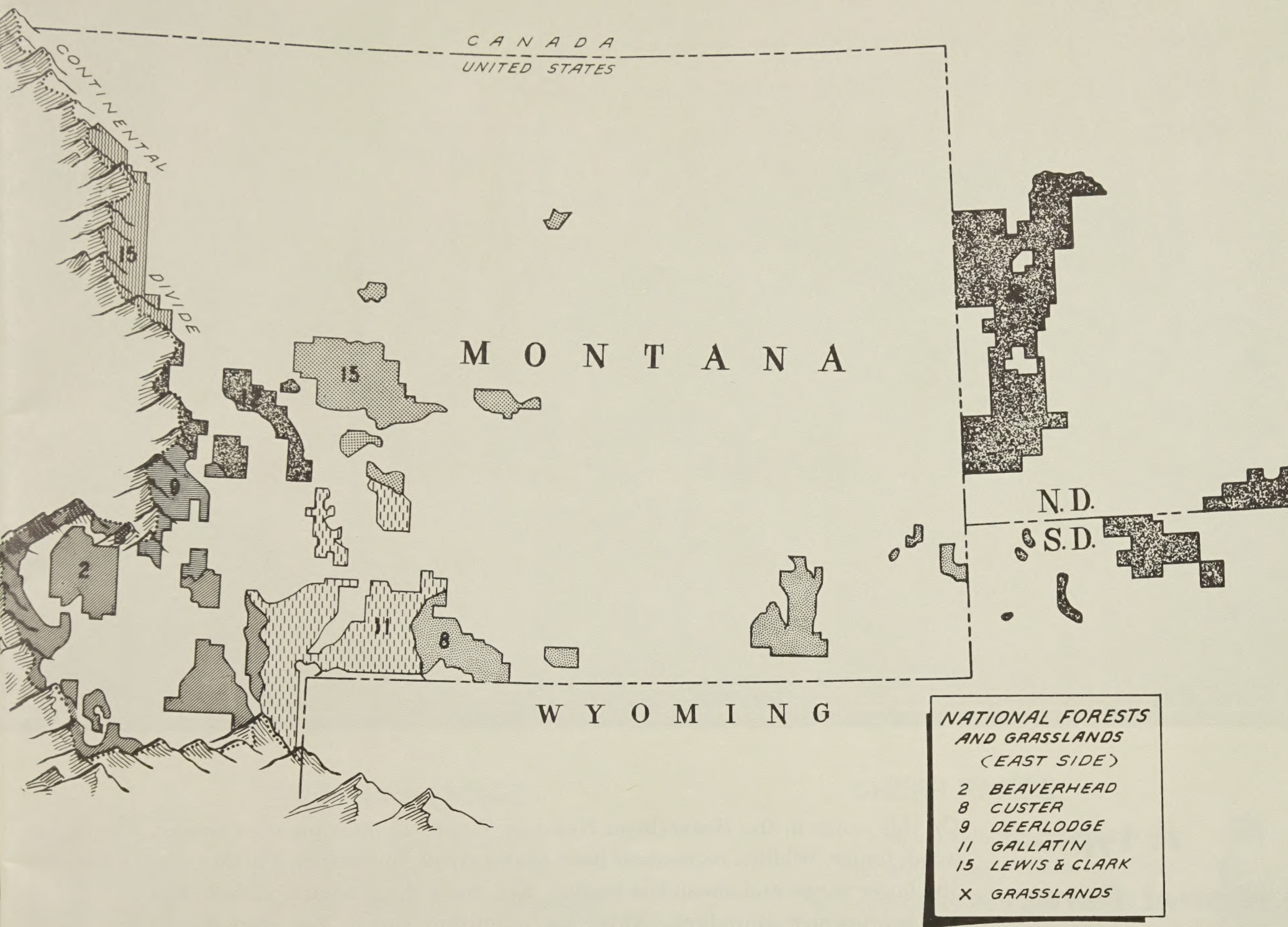
Northern  
Region  
ranges  
cover  
a lot of  
country



The West Side



# RANGE COUNTRY



Region One has “east side” and “west side” Forests. West side Forests lie in the Columbia River watershed, west of the Continental Divide. East side Forests are east of the Continental Divide; their waters drain into the Missouri.

Climate varies widely from east to west. There are also big differences in elevations. Vegetation varies from the shortgrass and mid-grass types of the northern Great Plains through the bunchgrass types of the foothills to the high alpine types of the Rocky Mountains; then through the dense white pine, larch-Douglas-fir, and open ponderosa pine types to the wet meadow and Palouse prairie types farther west. The principles of proper use management apply in all types.

## The East Side





## **A typical National Forest Range**

On this range in the Beaverhead National Forest all multiple uses (water, wood, forage, wildlife, recreation) have nearly equal importance. Cattle graze the lower range and sheep the higher. Elk, mule deer, moose, grouse, and fur bearers are abundant. Antelope, mountain sheep, and goat are in scattered herds. Bear are common.

Small streams provide trout fishing. Many hunters, campers and sightseers visit the area. Timber is managed and harvested. The watershed serves an irrigation reservoir below.

The land manager must correlate all of these uses.





## TIMBERED RANGE

Growing timber for lumber and other wood products is the principal use in some areas.



## SHEEP RANGE

Forage production is important on other areas. Many ranchers depend on National Forest grazing.



## RANGE IMPORTANT TO GAME

About one-third of the big game animals in the United States live in the National Forests. Wildlife requires adequate food and cover.







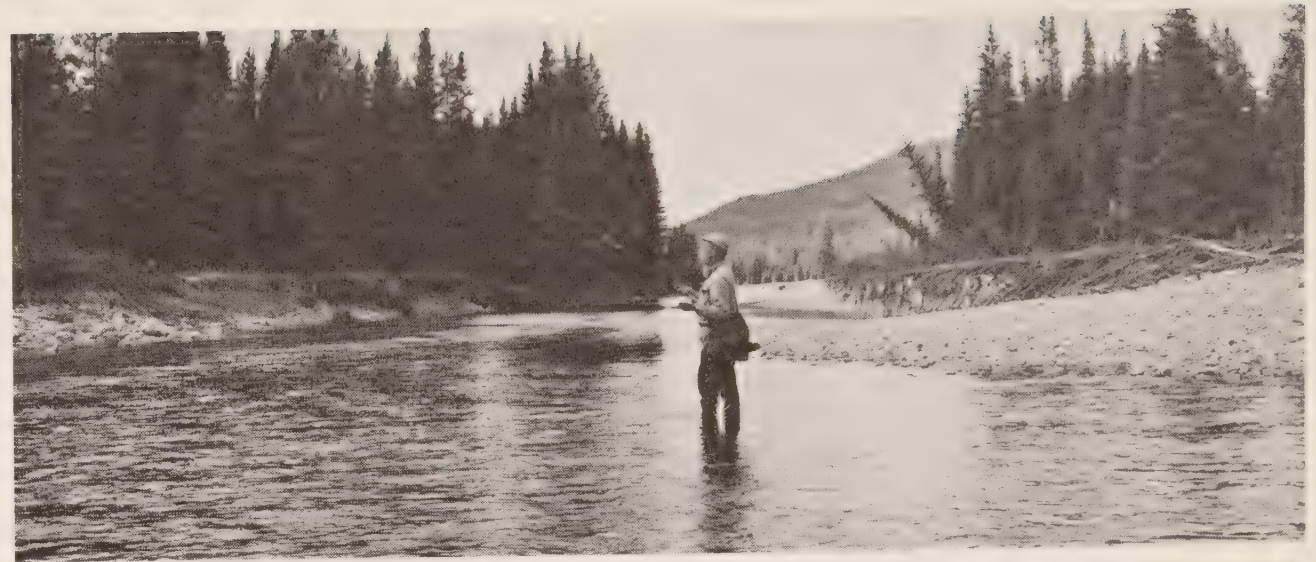
## **Water is wealth**

Water is the most important resource of the National Forests. Volume and quality of water are dependent on wise use of the timber, forage, wildlife, and recreation resources. Expanding populations and industries require increasing amounts of high-quality water. This water, from the upper Galatin River, is used over and over before it reaches the mouth of the Mississippi. It provides water for game and livestock at its source, supports heavy use by fishermen, and is used again and again for irrigation and power.



### THE RECREATIONIST

National Forests provide a variety of opportunities for outdoor recreation. This use has tripled in the last ten years and continues to increase.



### A HIGH PRODUCING MEADOW

The goal in range management is to maintain a perpetual forage supply and, at the same time, maintain the soil and vegetative cover.



### GRASS-FAT STEERS

Proper use management produces more pounds of meat per acre and a greater profit in the long run.





Judging range conditions and trends is necessary to estimate carrying capacities. It requires technical training and practical experience. Forest Service Rangers use improved range methods, developed through research and field trials.

Steps in range analysis are: (1) examining and mapping the grazing areas, (2) installing permanent study area bench marks for detailed measurements, and (3) preparing management plans for each allotment.

### LOOKING AT THE RANGE

First, the Ranger takes an overall look at the range allotment. The permittee





is asked to go along; he knows the range and how the stock use it. This information is needed for sound, realistic management planning.

The range is mapped and classified as suitable or unsuitable for grazing.

### **MAPPING AND CLASSIFYING THE RANGE**

A map, made from aerial photos when possible, is used to locate natural barriers and areas of feed and water. The scale is two inches to one mile. The base map shows land lines and topography. Roads and trails not already on the map are added, as are fences, water developments, and other permanent range improvements. Areas of timber, brush, and grass are outlined; these and the dominant plants are described by combinations of symbols.





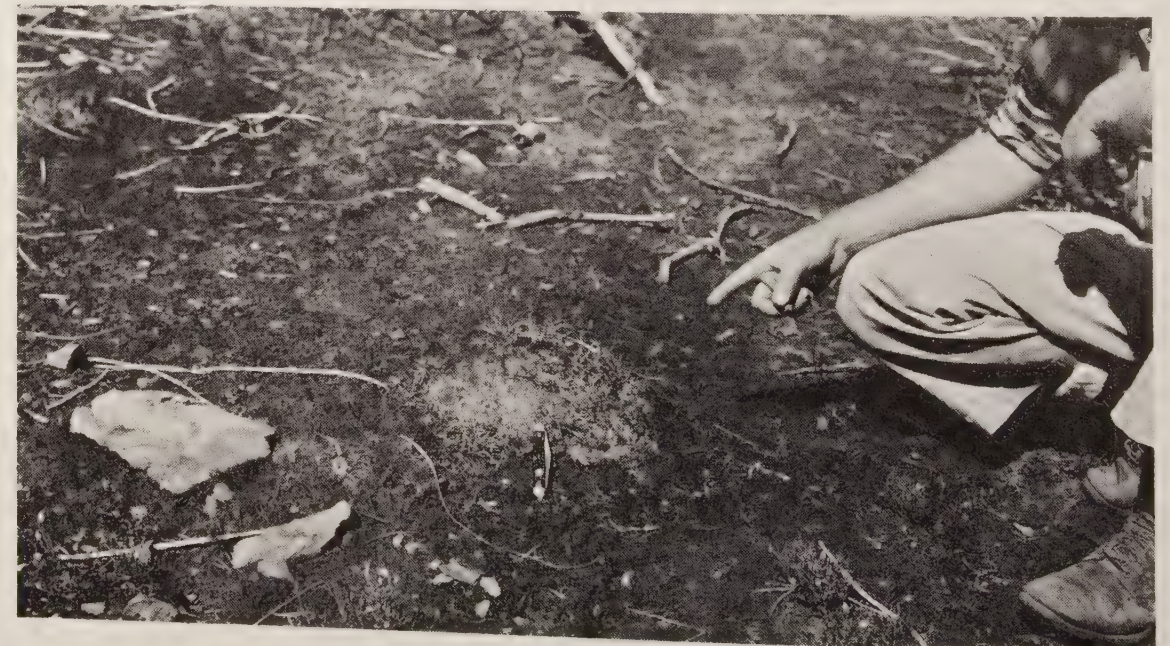


### STEEP SLOPES

Not all range is suitable for grazing.  
Some may be too steep.

### ERODING SOILS

Some ranges have areas of unstable soils,  
with insufficient ground cover to allow grazing.





## PRIMARY RANGE

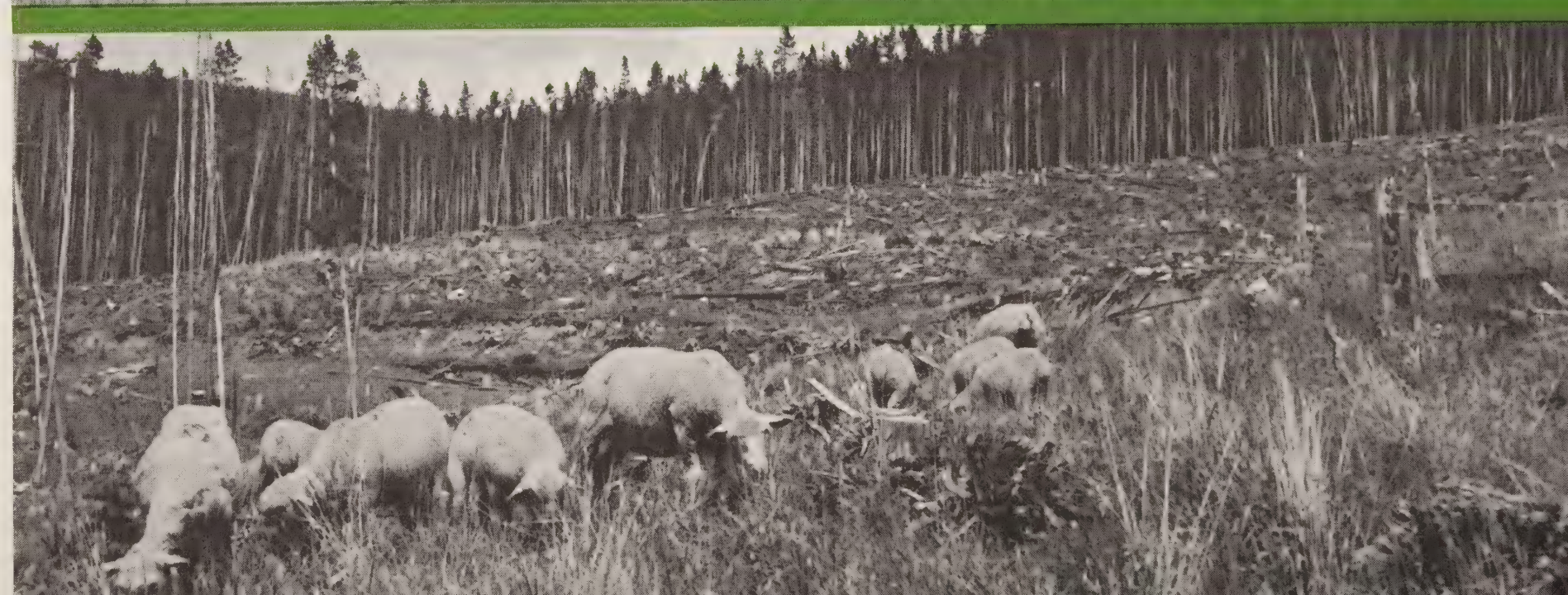
Ranges suitable for grazing are classified as "Primary" or "Secondary." Primary range is where livestock graze with little or no management, on gentle slopes, near water, usually in bottoms or along ridges. It is the area that first suffers overuse.

Secondary range is less accessible or is far from water. Livestock left to themselves make little use of secondary range until feed is gone on the primary range. Secondary range requires special management to bring it into use, if it is to have carrying capacity. Some secondary ranges may be key winter game ranges. This must be considered in planning range development.

## SECONDARY RANGE

## TRANSITORY RANGE

Some ranges are *transitory*. They are temporarily opened up by logging or fire. They require special management because grazing is a temporary use. They may provide substantial forage for game and livestock before timber reoccupies the area. Grazing of such areas is governed by its effects on soil and timber reproduction.







Primary ranges are classified as to condition and trend; secondary range is usually in good or excellent condition. Condition classes for primary ranges are: EXCELLENT, GOOD, FAIR, POOR, VERY POOR.

### GOOD RANGE

This range rates good because of good ground cover and the high percentage of desirable plant species.



### FAIR RANGE

A range in fair condition has a high percentage of less desirable forage plants.

**THE NORTHERN REGION  
HAS MORE RANGE LIKE THIS**



### POOR RANGE

This poor range has good ground cover but should be growing high-producing bunchgrasses instead of low-producing grama grass and pricklypear.



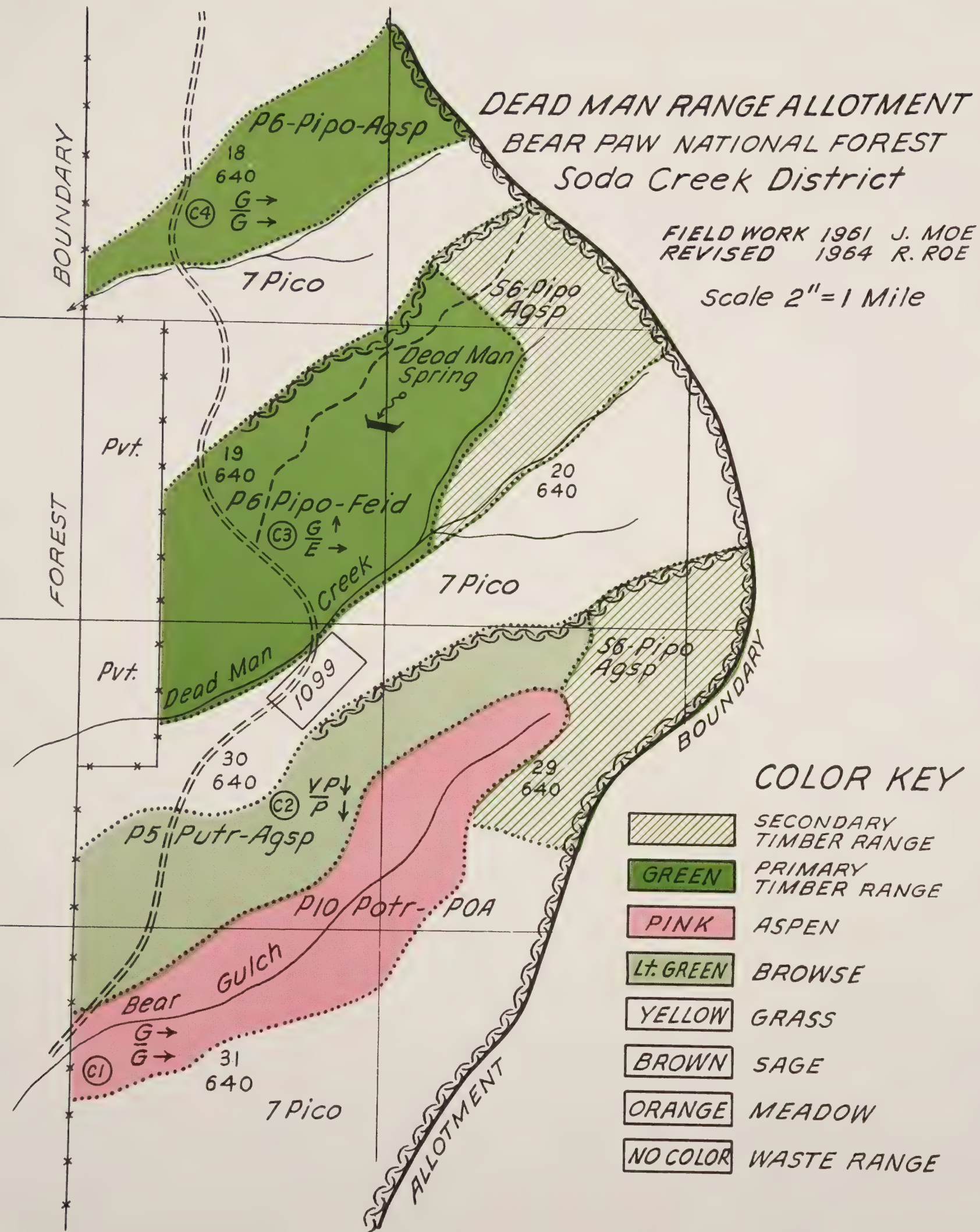
### VERY POOR RANGE

Very poor ranges produce very little and provide little ground cover. A very poor range may require a complete rest to recover.

THAN IT HAS RANGE LIKE THIS.



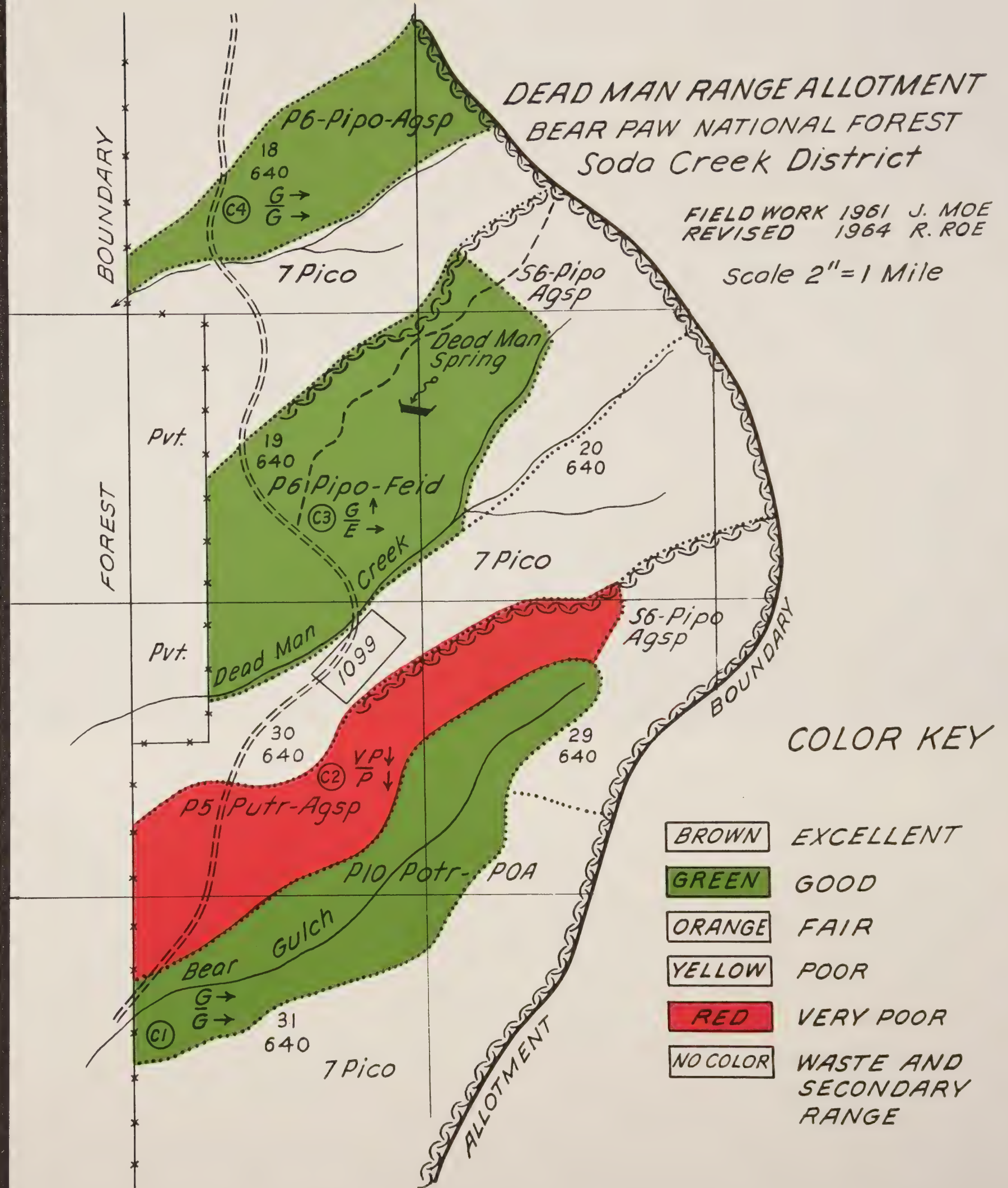




Two maps are made. This is a vegetation type map. The colors show the vegetative types. Green indicates feed under timber; browse types are light green; aspen areas are shown in pink. Additional colors are used for other types. Primary range is in solid color. Secondary range is hatch-lined. Range with no value for livestock is uncolored. This map shows where the feed is.



This is a condition and trend map. It shows the condition of the primary range on the allotment. Excellent range is colored brown; good range is green; fair range is yellow; poor range is orange; very poor range is red. The trend of the range is shown by arrows. An arrow pointed up shows trend is upward (improving). The arrow points down if the trend is down. The condition and trend is expressed as a fraction ( $\frac{E}{G} \uparrow$ ). The upper letter and arrow indicate vegetation condition; the lower arrow and letter indicate soil erodibility. This map helps in planning a system of management to relieve those areas with a downward trend or in poor condition.







### INSTALLING A RANGE TRANSECT

Range transects are installed after mapping. These are permanent locations; measurements are repeated at 3- to 5-year intervals to determine the trend of the range. Sites are selected during the mapping. They are usually on “key areas” that represent various conditions on the allotment.

A 100-foot steel tape is stretched. Angle-iron stakes are driven at each end and at the midway point. The stakes are left as permanent markers so that the tape can be stretched over the same points for subsequent readings.





## **PHOTOGRAPHING THE TRANSECT**

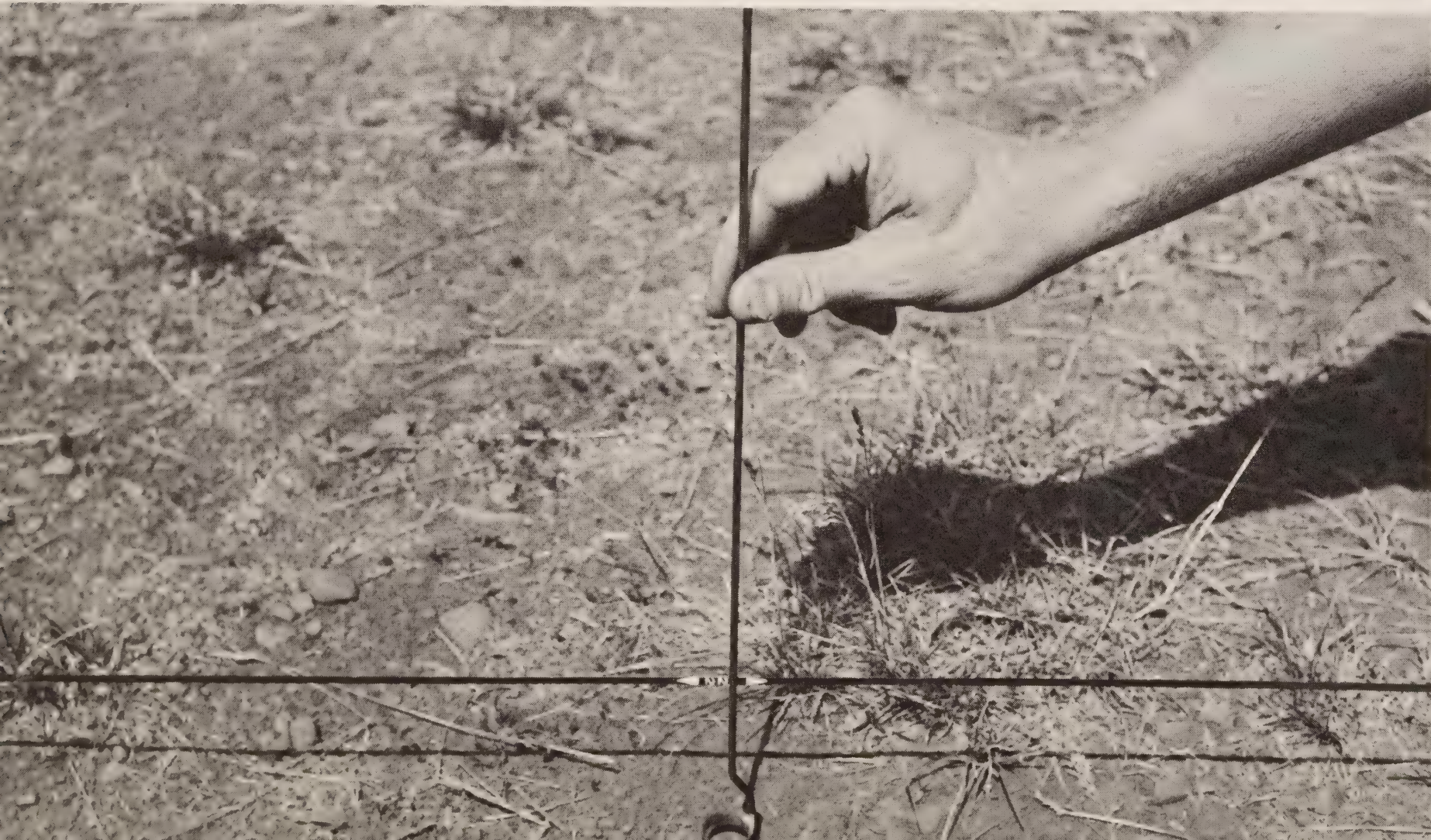
Two photographs are taken. One shows a yard-square area  $3\frac{1}{2}$  feet from the beginning stake of the transect. Details of soil and vegetation are shown in the closeup photo. The other photograph is an overall view of the transect and some of the surrounding area. It shows the direction of the transect line and general appearance of the site. This helps identify the area.





### THE READING LOOP

A wire loop  $\frac{3}{4}$  inch in diameter is lowered at each one-foot mark along the tape. Whatever it contains is recorded: grass, soil, weeds, rock, litter, moss, or erosion pavement. For each transect there are 100 loop readings.



### THE HIT

This is a “hit” on bare soil. If, at the end of five years, the loop encountered a perennial grass plant at this point, and, if this occurred at several points along the tape, it would indicate an improvement in the range.



## IDENTIFYING A PLANT

Plant identification is necessary in range study. Individual plant species, like people, make up the community. The plant community is judged by the species present. Species indicate range health. Certain plants are “desirable.” Others are “undesirable” as range plants. The technicians must be able to identify 50 to 60 grasses and grasslike plants, 200 to 300 forbs (flowering plants), and approximately 50 browse species, in addition to the conifers and hardwoods of the overstory.

A range type is a plant community. The range manager must know the key species in each type.



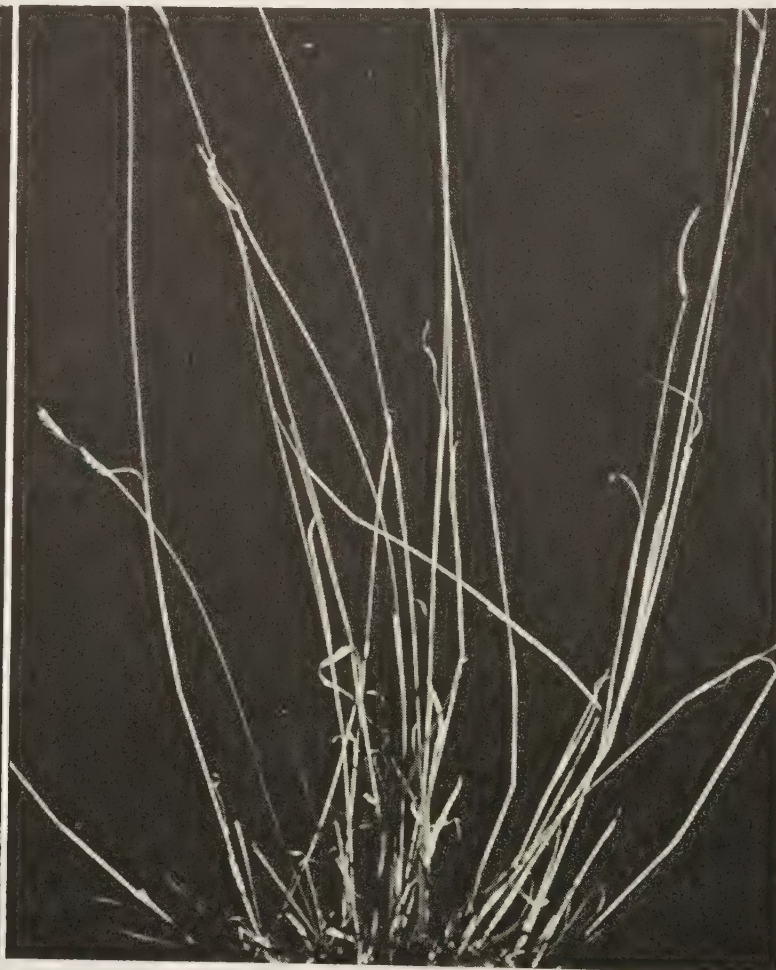


Observations at each footmark along the transect line are recorded. Future readings at these points are compared with the original readings. All plants are identified and classified as *Desirables* (decreasers), *Intermediates* (increasers), or *Least Desirables* (invaders). The percentages in each class determine the range *condition*. The change in successive readings is indicative of the range *trend*.



### ROUGH FESCUE

Rough Fescue is a desirable plant. If overgrazed, it will decrease and be replaced by less desirable forage plants. A range with mostly desirable plants produces the largest volume of good forage.



### GRAMA GRASS

Grama grass is an intermediate. This class of plants will increase under use that reduces the number of desirables. Though these plants may be palatable to livestock and may provide good ground cover, they provide a lower volume of forage.



### THISTLE

Thistle is a least desirable plant. If use is so heavy that both desirables and intermediates go out, this class of plant takes over. Such plants also take over when soil is disturbed. Usually they have little or no value as forage for livestock or game.

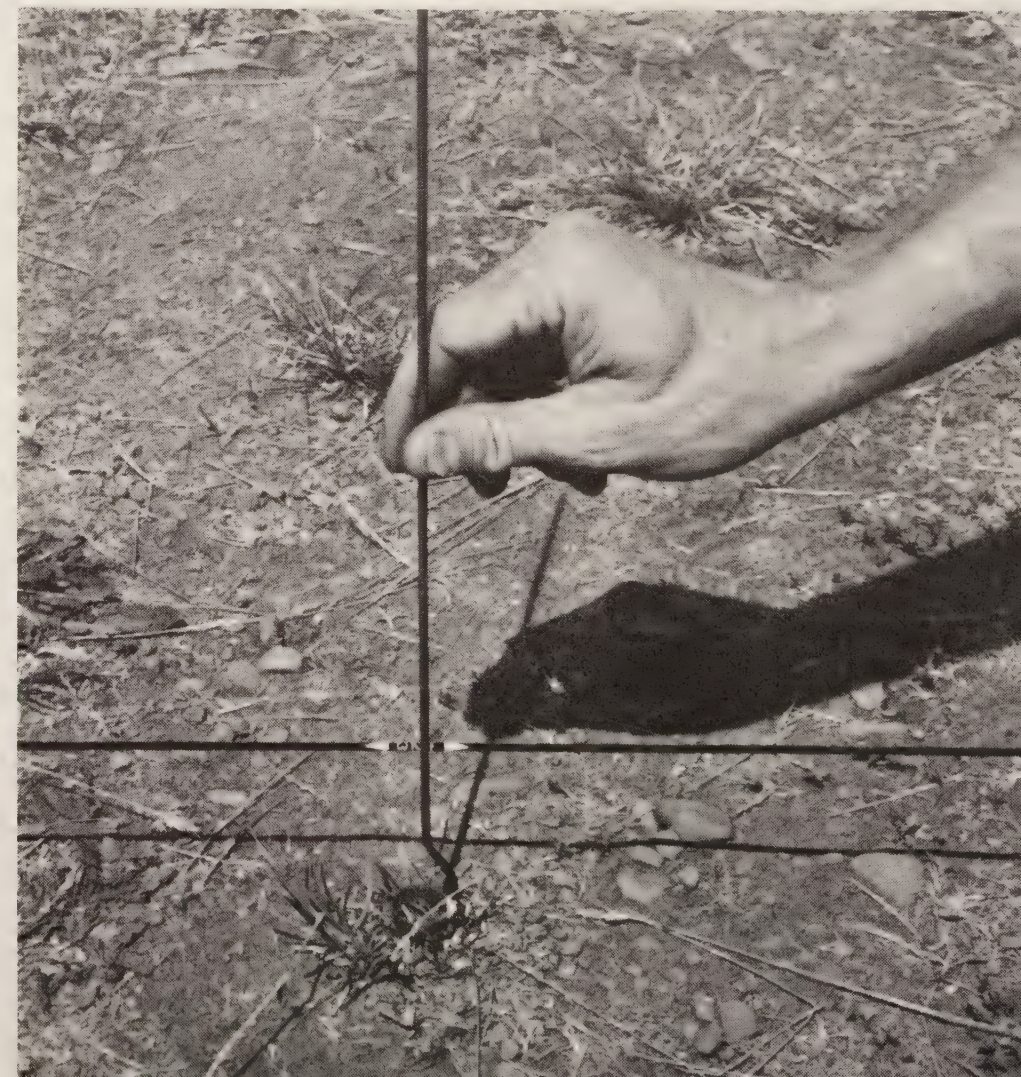
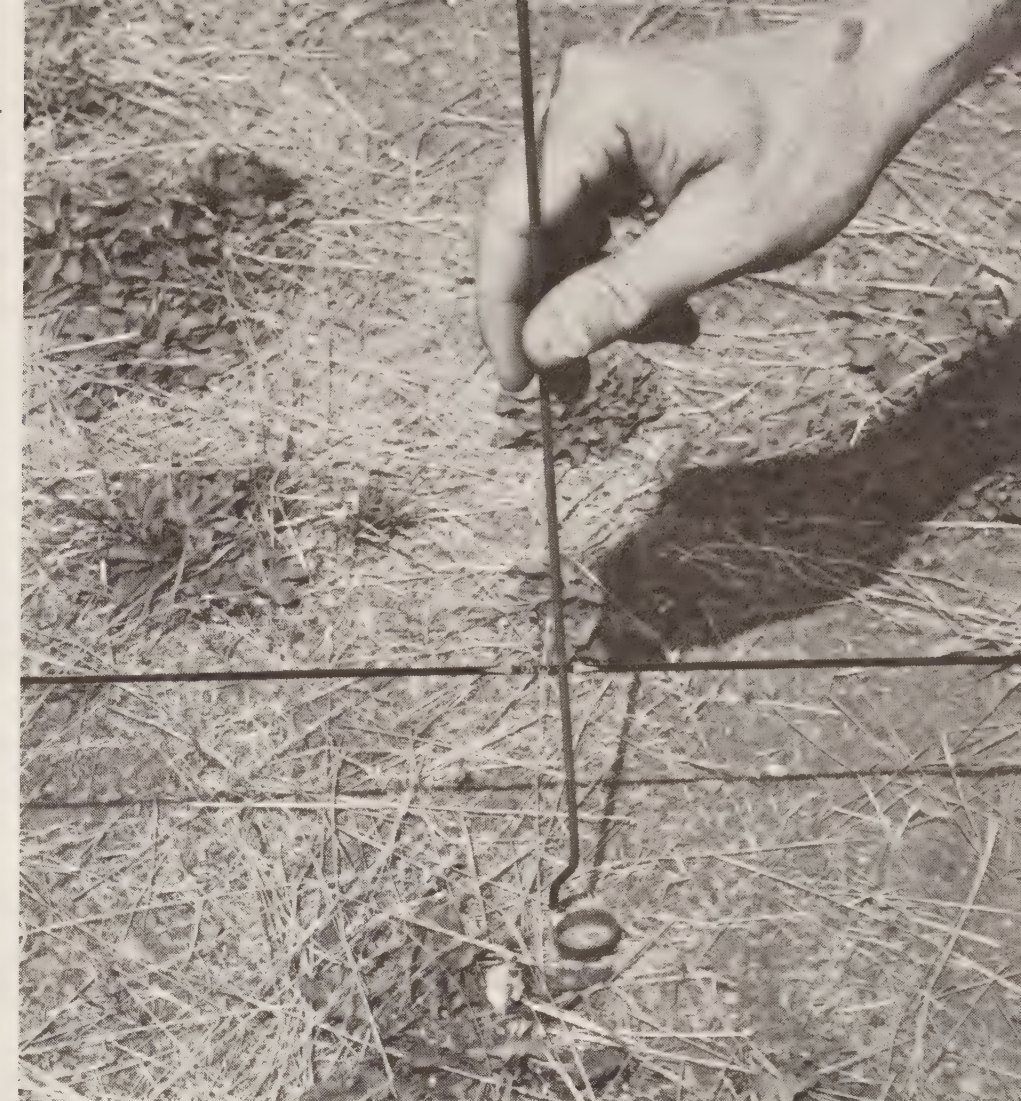


Dropping counts are made along the transect line to compare use by livestock and big game. A cow, for example, averages 12 droppings per day, while deer and elk average 13. An area six feet wide by 73 feet long (1/100 acre) is studied.

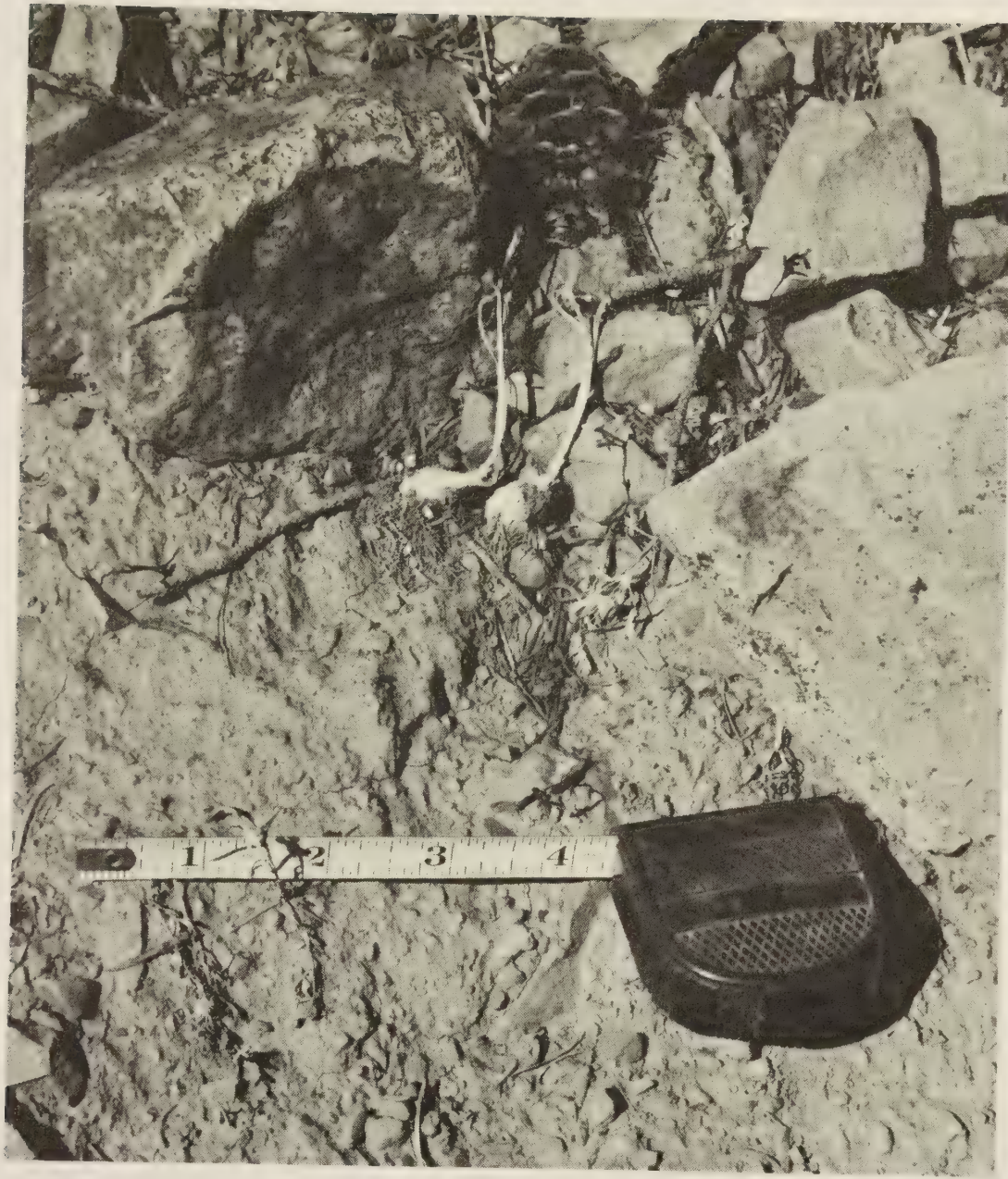


### SOIL CONDITION

Soil condition is based on the number of hits on plants or plant residue (litter). Research shows that good ground cover is necessary to maintain a satisfactory watershed to prevent fast water runoff and soil erosion or floods.

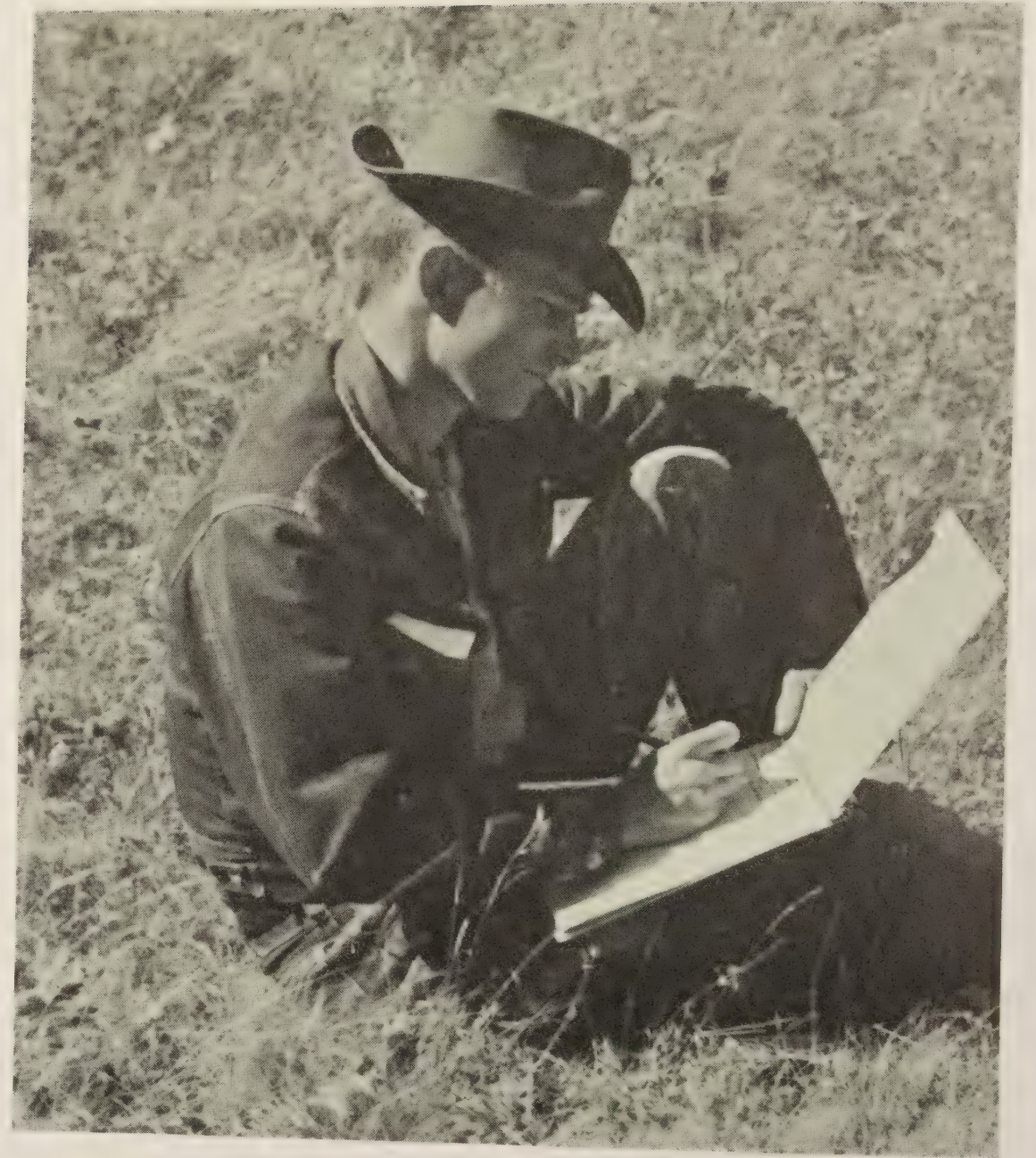






### WASHED OUT PLANTS

Ground cover is *important*. Loss of two to three inches of soil from a single summer rainstorm completely exposed and killed these wild onion plants because of the lack of ground cover.



### SUMMARIZING

Information from one or more transects, on a given key area, is recorded and summarized to determine the condition class. This summary also gives an indication of trend. Condition of vegetation is based on (1) the percentage of desirables, intermediates, and less desirables; (2) the vigor of plants and percentage of ground covered or density of plant growth.



### RANGE TREND

Trend may be estimated from plant indicators and soil stability.

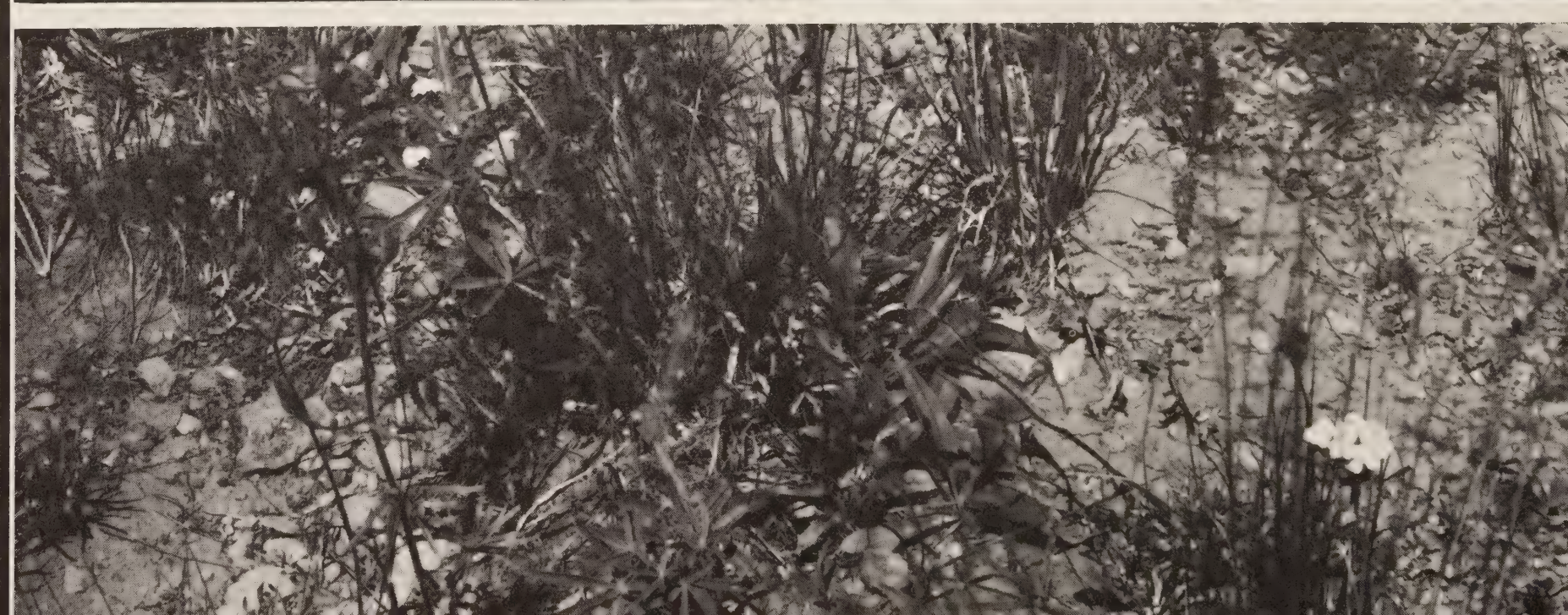
Better estimates result from comparison of successive transect readings. This range, with a high percentage of invading plants, appears to have a downward trend.

### MEDUSAHEAD WILDRYE

Invaders like this indicate a poor range. The range manager needs to be alert to prevent such plants becoming established.

### WHAT THE RANGE MANAGER WANTS

An upward trend is indicated when desirable plants become established in bare areas.







## FIXING THE LOCATION

The final step, in the initial field work, is to survey the location of the transects so they can be relocated for future measurement.



## MODIFIED METHODS

One hundred readings can be taken on a range type by running a "paced transect." Instead of a permanent staked transect, the 100 readings can be paced off. Record whatever is found within a  $\frac{3}{4}$  inch loop placed at the toe of the boot. While readings can be repeated in later years, the same points are not remeasured.





### CLIPPING A PLOT

The pounds of forage produced per acre can be estimated. Here the examiner clips 96/100 of a square foot.

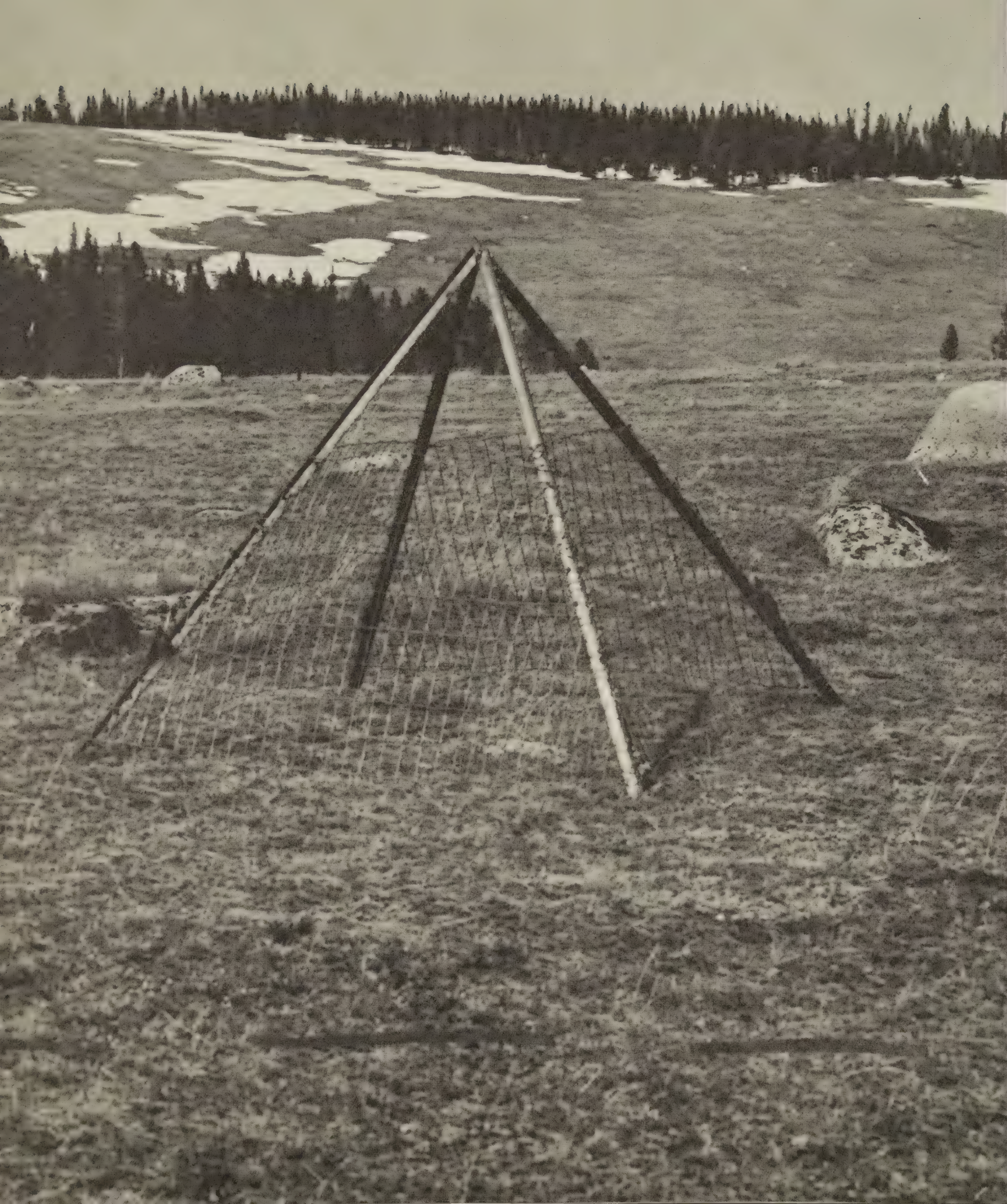
A mature cow needs about 25 pounds of feed, dry weight, per day. A range producing 2,000 pounds of dry feed per acre can provide 32 cow-days of grazing or about one animal-month per acre if 40 percent (800 pounds) of the forage can be grazed.



### WEIGHING THE FORAGE

The clipped forage is weighed. To get pounds per acre, multiply the weight (in grams) of clippings from 96/100 of a square foot by 100. This aids estimating the carrying capacity of the range.





### A UTILIZATION CAGE

Clippings are used for other estimates. Utilization cages are placed on the range at the beginning of the season to protect the total annual growth within the cage.

By comparing the weight of forage clipped from a protected plot with the weight clipped from a grazed plot outside the cage, the percent of annual growth removed by grazing is calculated.

Utilization is defined as that portion of the annual growth of range plants removed by grazing animals. Utilization cages are designed to protect growing plants so that the annual growth can be measured. Various methods are used to measure the amount of forage removed by grazing or browsing animals.





## FENCED ENCLOSURE

Potential forage production of a range is judged by comparing grazed areas with ungrazed areas in fenced enclosures and relict areas inaccessible to grazing animals.



## RELICT AREA — AN INACCESSIBLE MESA





A visit to a Montana State College  
Experimental Range.



Advice and knowledge of range technicians in other agencies — such as State Fish and Game Departments, the Agricultural Research Service, Soil Conservation Service, Bureau of Land Management, and Extension Service — are freely solicited. Close liaison is maintained with state colleges and universities and experiment stations.

Field Trip of Agencies'  
representatives and ranchers.



## ELK ON THE NATIONAL FOREST

Multiple-use management of the National Forest ranges provides for big game.



## HEAVY USE BY GAME

For deer, and frequently elk, shrubs are the principal feed.

## AN ENCLOSED STUDY AREA

There can be competition between livestock and big game for forage.

Exclosures are built to evaluate such competition.





### MEASURING GAME USE

Measuring browse condition  
on winter elk range.



### DETERIORATED GAME RANGE

Browse sometimes disappears almost entirely  
from an area that previously was a good big game  
habitat. When this happens, game animals either  
starve, move to other areas, or adopt unnatural  
food habits. When they adopt new food habits,  
they may compete with livestock.





The objective is to correlate big game and livestock use of the range so as to maintain existing game herds in harmony with livestock use. Livestock are regulated by controlling numbers and season of use. Hunter harvest is designed to keep the number of big game in balance with available food.



*An elk hunter*

*A big deer hangs*







*A white-tailed fawn*



*A calf elk*



*An antelope fawn*

Adequate forage for  
big game animals results  
in healthy herds  
and continuing replacement.



*A bull elk*





*A stream bottom in good condition*



*One that isn't*

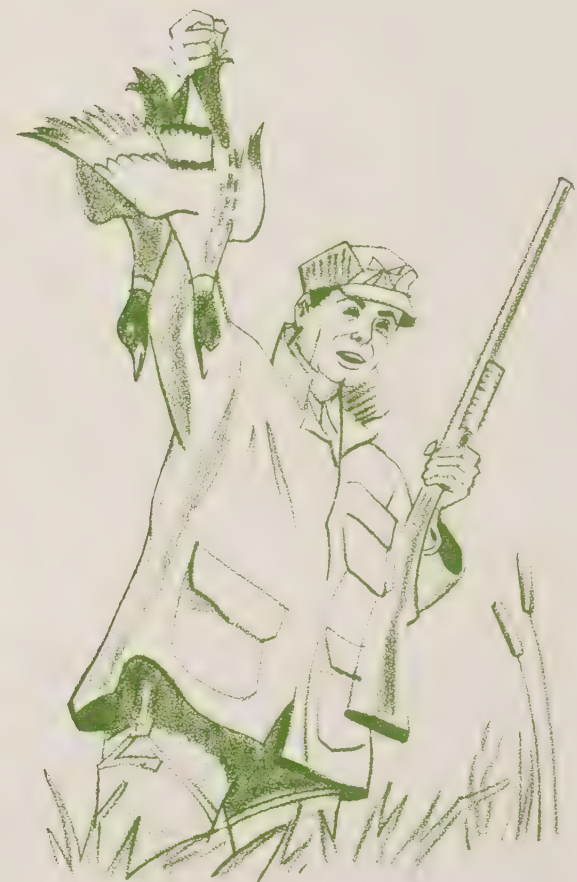


*Effect on trout habitat must be considered in preparing range management plans.*





*A Franklin grouse*



Small game  
and game bird habitat needs  
are also considered in preparing  
range management plans.



*Good hunting from good habitat*





*A ground squirrel*

### **RODENTS CAN BE VERY DAMAGING TO RANGE**

Control measures may be needed but the controls must be adapted to avoid damage to other creatures. For example, if poisoned baits are used, they should be placed in burrows, out of the reach of livestock and game animals.





*Trail Riders*

Approximately 10,000 horses and mules graze Northern Region forage in the summer. Most of this grazing is on approximately 100 "back country" allotments where there is no competition with cattle and sheep. Studies are carried on and management plans are made for these areas also.

*Pack strings*

In a few instances, horses and mules graze on cattle and sheep allotments; this use is correlated in allotment plans.







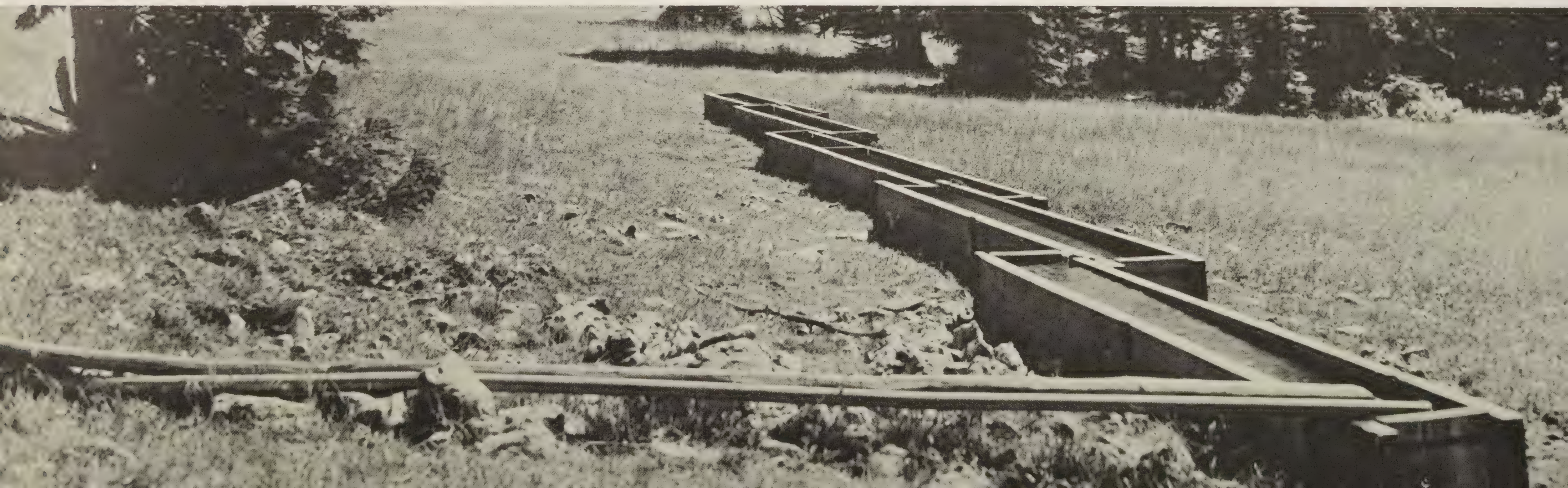
*Spraying sagebrush*



*Preparing a seedbed— the brushland plow*

Range allotment analysis includes locating areas that need improvements. These areas might require undesirable plant control, seeding, or poison plant control. Or, they may require physical improvements such as drift fences, unit fences, water developments, trails to new feed, or structures for handling livestock such as corrals or loading chutes.

*A water development for sheep*







In planning improvements, costs must be weighed against expected returns. Sometimes results exceed expectations.

### FORMER SAGEBRUSH TYPE

This was formerly a dense sage stand. Spraying with 2, 4-D killed 95 percent of the sage plants. Within one year after spraying, production of desirable forage plants tripled, but enough sage plants remained for the grouse and deer.

### FERTILIZED MOUNTAIN MEADOW

Nitrogen applied on this mountain meadow at the rate of 80 pounds per acre increased forage production from 2,700 to 4,800 pounds per acre. Coarse sedge and rush species decreased and more desirable grasses increased.

Forest Rangers and ranchers must work together in planning and executing range improvement projects. Undesirable plant control and seeded areas must be protected while new plants are becoming established. The rancher must adjust his management of the livestock on the range for a time.

Sometimes a rotation grazing system can protect treated areas with a minimum impact on the ranch economy. The rancher has to decide this.





The next-to-the-last step in getting information for a range management plan is to determine the average date when the different areas on the allotment are ready to be grazed. This is called the “vegetative readiness” date. It is when both the plants and the soil are ready for grazing. Because of the wide variation in elevation, topography, plants, soils, and climate, this date can range from about May 1 to July 15.

Certain key plants on each allotment indicate range readiness. A rule of thumb is that most plants of the dominant flowering species should be in full flower and desirable grasses should be “in the boot” or headed.

The opening date given in the permit is an average date. Because of annual weather differences, the actual date of range readiness may vary. Growth must be checked each spring so that the rancher will know when to expect to put stock on the range. Usually, this is not more than two weeks earlier or later than the average date.

Soils must be firm and past the muddy stage. Much damage can result from compacting the soil by trampling when it is too wet.



*Idaho Fescue headed*



*Balsamroot in full flower*





*Counting on*

The final figure needed for the management plan is an estimate of the animal-months of use the allotment will support. In the Northern Region basic data for this are obtained through a close check each year of the use made of the allotment, by kind and class of livestock. Livestock are counted going on and coming off the range. Records of use, correlated with the judged condition and trend of the range, form the basis for estimating the stocking rate.



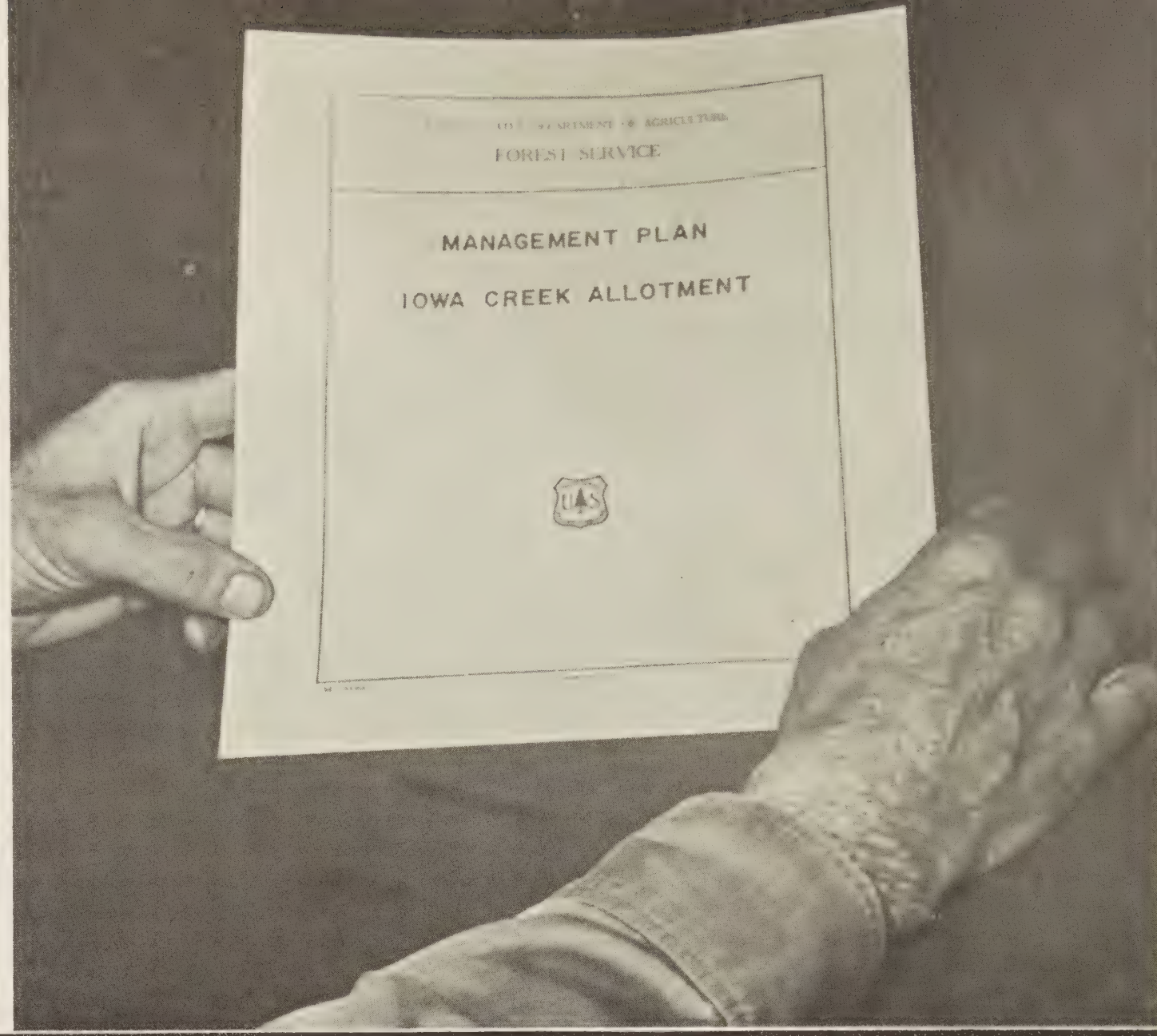


*Planning*

When all preliminary information has been gathered, the rancher and the ranger, working together, draw up a management plan tailored to fit the allotment. Various uses must be correlated.

The management plan includes a system of grazing that appears best for maintaining the allotment in good condition with an upward trend. Care is given to arresting downward trends.

The plan spells out the responsibilities of both the land manager and the permittee.



*The written plan*





*Fixing fence*



*Putting out salt*

The rancher is responsible for the stock handling, including such items as moving stock to get proper distribution, putting out salt, moving salt to fresh feed, and maintaining range improvements.

*Moving salt*



*Moving cattle*







The Forest Ranger is responsible for checking vegetative readiness, rereading transects, recording utilization measurements and proper use data, and checking for unpermitted livestock.

The permittee is welcome to accompany the Ranger on these jobs.

*Measuring utilization*



*Rereading a transect*





*Building fence*

Major jobs, such as extensive fencing projects, can be planned for cooperative accomplishment. Usually the Forest Ranger contributes toward the materials and the rancher the labor.

The Ranger can contribute only to the extent that appropriated funds are available.





*Aerial view of range with proposed pasture units*

The range management plan is directed to the most practical and economical system of use that will maintain ranges in their highest productive capacity. This is proper use.

A range may be divided into units so that one unit can be rested each year. Other units are grazed at different times each successive years. Other systems may be used. Any system of deferred or rest rotation is better for the range than season-long grazing, or grazing the same unit at the same time each year.

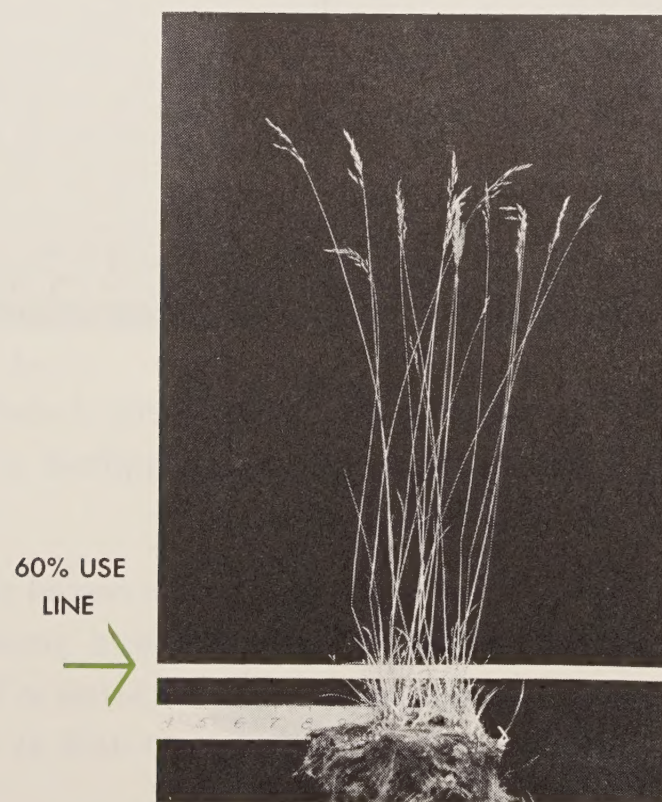




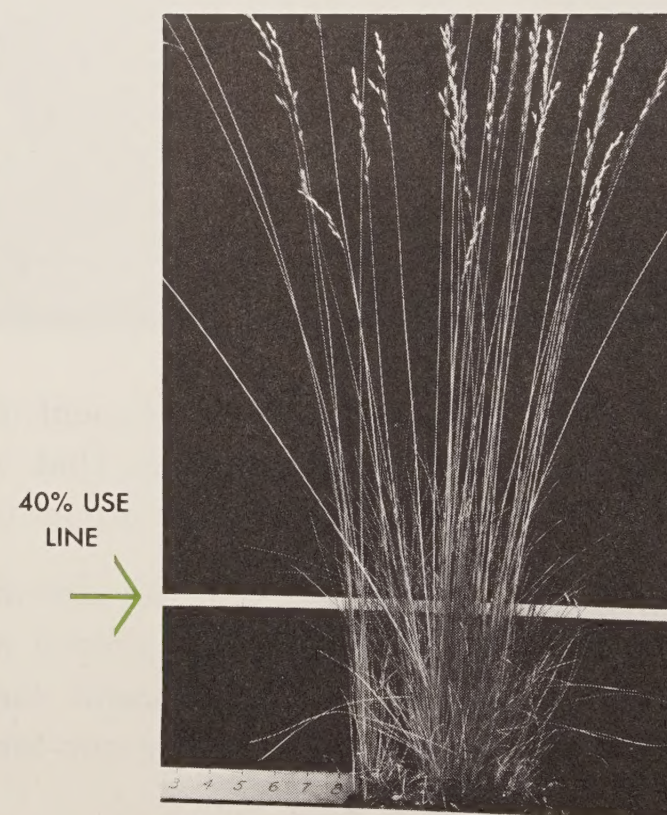
Management plans should be modified to meet changing times and conditions. Also, a plan will be revised in the light of new and more knowledge and data.

Management plans are changed only by mutual consent of the Ranger and permittee. Thus we maintain proper use.

*Ranger and rancher  
talk it over on the range*



*Low producer*



*High producer*

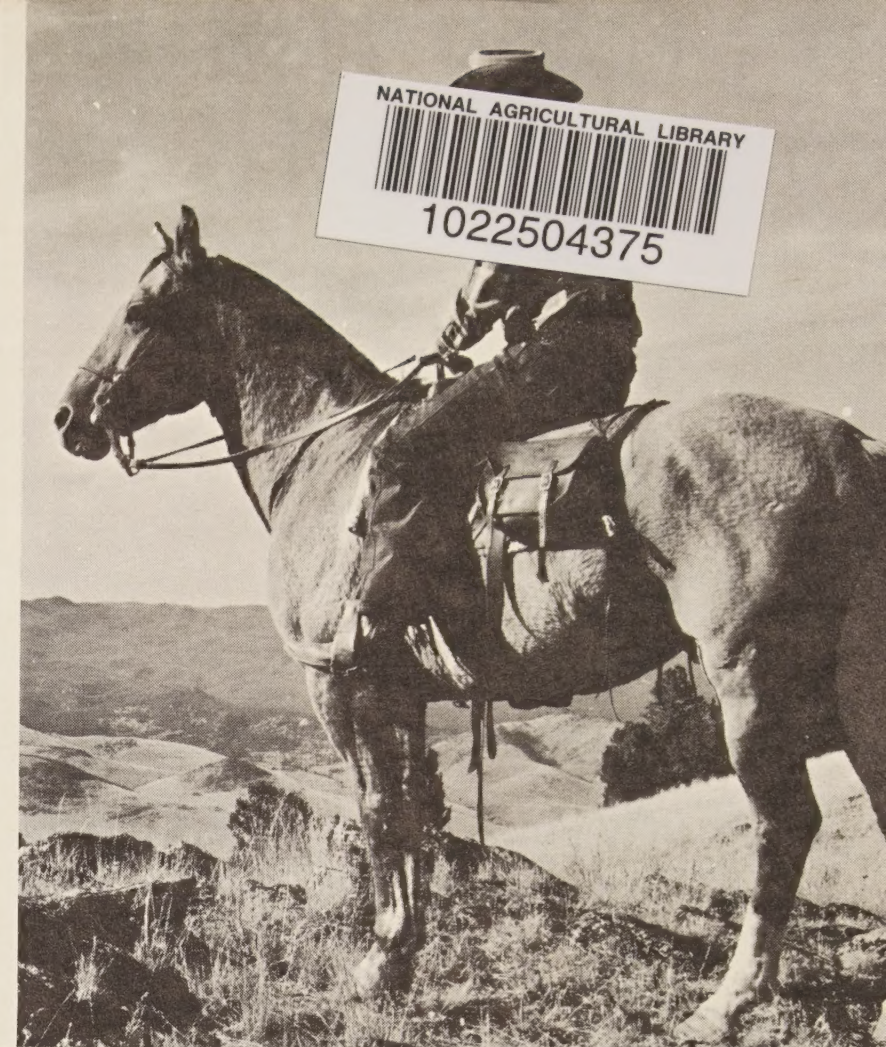
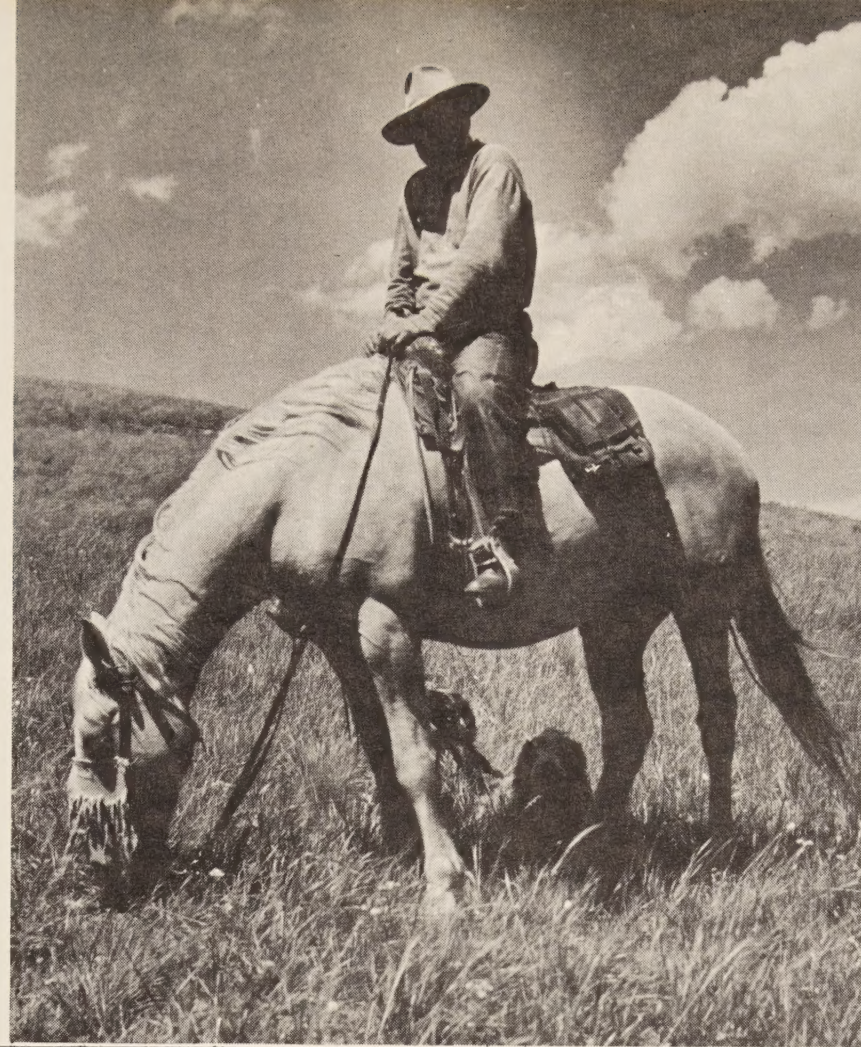
Proper use can pay. Consider a rough fescue range in excellent condition. Perhaps only 40 percent of the annual growth can be used, but this range produces 3,000 pounds of forage per acre. Forty percent of 3,000 pounds is 1,200 pounds.

Suppose we have overused this range consistently and it is now growing Sandberg bluegrass. Possibly 60 percent of the annual growth of Sandberg bluegrass can be grazed but this produces only 800 pounds per acre each year. Sixty percent of 800 pounds is 480 pounds of forage. Which is best?

Some ranges must be used lightly to get them back to high production.



Range allotment analysis and proper use management recognize the importance of the stockmen in making the fullest possible use of the grazing resources of Northern Region ranges.



The goal is to bring all National Forest and National Grassland to the peak of production and to sustain this production, correlated with the other multiple uses. This objective is intended to provide maximum stability to the ranching industry.





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